

## ANOTHER SIDE OF THE E-BOOK PUZZLE

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### ABSTRACT

Electronic books, while not as popular as electronic journals, continue to be produced, marketed, and used with marginal popularity. Why is it that we see a strong public demand for electronic journals and a reluctance to use e-books? One reason that e-journals succeed may be that the articles are often shorter and easier to print. Research on user preferences indicates mixed reactions to the use of e-books. Is it possible that the printed word is the best technology for monographic publications? Is the problem with e-books more complicated than simple nostalgia for the touch and feel of a book? Existing research on the utilization of electronic text has not been widely distributed. This article will review survey responses, reactions, and feelings toward e-books, along with some of the current research findings indicating there may be more problems with e-books than meet the eye.

### INTRODUCTION

E-books were predicted to take off fast, with expectations that they would rapidly replace their print counterparts (Dillon, 2001; Gunter, 2005; Rao, 2003, 2004). When this did not happen as predicted, the advocates retreated somewhat but with a continued insistence that there were some issues, such as a workable business model, that needed to be resolved. Once these issues were resolved, they insisted, e-books would take over the print market. Librarians have also been blamed for not doing more to promote electronic books with the assumption that if they employed better marketing strategies for this new product, then e-books would see the insurgence in usage that was initially predicted (Bennet & Landoni, 2005). Long (2003) stated that "e-books have been around for at least three decades" (p.29). These three decades have provided enough time for some interesting research findings.

### THE PRODUCT

Most of the literature on electronic books and their lack of anticipated success point to problems with business models but quickly goes on to express enthusiasm and anticipation for future success (Gunter,

2005; Herther, 2005; Sandstrom, 1999). Advantages and disadvantages are listed to highlight some of the better features and possibly to point out the need for continued development, while the disadvantages are downplayed. The advantages are often listed over and over like a well-tuned marketing ad. The lists include features such as around-the-clock availability independent of actually visiting a library or a bookstore; textual mark-up features; increased storage capacity making it easier to carry multiple titles; and increased shelf-space and ease of re-shelving (Armstrong et al, 2002; Chu, 2003; Clyde, 2005; Gunter, 2005; Herther, 2005; Littman & Connaway; 2005; Long, 2003; Rao, 2003, 2004). With regards to the textual mark-up features, however, very few articles discuss exactly how helpful these will be to consumers who are reading the latest bestseller on a palm pilot. Unfortunately, while the ability to search and highlight text is a definite enhancement over print text, it is not a feature that is currently available with all e-books or readers. Another advantage listed for electronic books is that they are considered to be environmentally friendly (Rao, 2003) because they don't require paper, but few if any articles address the problems of recycling electronic devices or that electronic devices require a power supply that typically is generated with non-renewable energy resources.

Disadvantages to e-books tend to be downplayed in the literature as if to acknowledge there are some problems but with expectations for improvements in the near future. The biggest disadvantage cited and most listed reason for the slow growth of e-books is the lack of a standardized product with a sustainable business model. E-book readers and e-book software have yet to stabilize or to find one industry standard to allow transferability (Gunter, 2005; Sandstrom, 1999). Dillon (2002) notes that "by mid-2001, there were 21 competing e-book formats in use" (p.354). Multiple reading devices and software, most of which tend to be proprietary in nature, mean less portability and transferability from one reading device or software to the next. Other disadvantages found with e-books are the limited selection of titles, subscription-based access instead of ownership in perpetuity, and the cost of the technology which may be too expensive for the average

consumer. Another market disadvantage with e-books that tends to be glossed over is print limitations. Digital Rights Management concerns continue to be compounding factors in developing a sustainable business model (Armstrong et al., 2002). But even with the fact that printing out entire books is neither an efficient, cost-effective, or environmentally friendly method of obtaining a copy, there remains a continued desire by users to print electronic text, perhaps because the print offers better resolution and is easier to read. Bennett and Landoni (2005, p. 15) note that this reliance on printing e-book content, "negates the benefits that e-books offer and adds additional costs." However, most users prefer reading print text instead of reading an electronic format (Liu, 2005).

E-book technology has also failed to provide a viable reader that is portable and affordable enough for the average consumer to purchase while eliminating problems of text visibility and eye fatigue. Screen resolution remains very poor in an electronic environment (Gunter, 2005). Print resolution begins at 300 dpi (dots per inch) while the resolution on monitor is around 100 dpi (Rao, 2004). This means that reading electronic text requires the brain and the eyes to work harder to achieve comprehension. Eyestrain becomes a side effect from reading in an electronic environment, as anyone who has worked at a computer all day knows all too well. Bennett and Landoni (2005) have noted that "screen resolution is still not comparable with paper resolution and this has both inspired research in the area of technical quality and created the perception that there is a need for extra value to be added to e-books in order to justify the discomfort of 'reading' them on a relatively poor resolution screen" (p. 10). Liu (2005) noted that "the lower resolution on a computer monitor is one of the major factors that people print out documents (especially lengthy documents) for reading" (p.702). Of course, restrictions on printing electronic books frustrate this desire to print the text for reading. As Herther (2005) notes, "the issue of protecting content and the rights of the content owner, while giving users flexibility (to print) is still a hot button issue in the industry" (p. 48).

While it is easy to note that business model problems and a lack of standards have definitely not helped with the marketability of the product, perhaps there is more to electronic books than simply listing reasons why they are a better format than print. If one were to take an informal poll of users, say at a mall or a supermarket, and simply ask people if they have used electronic books and, if they have, did they find the experience pleasant enough to repeat, we might find that the majority of people don't want to read an electronic book. So what is it about an electronic book that makes it less attractive than paper? Electronic journals are expected, and in some cases even de-

manded, by library patrons, but this same demand and expectation do not seem to carry over to electronic books.

In reviewing the survey literature the data appear overwhelmingly to suggest that people do not want to read electronic books, at least not for sustained reading, and perhaps even more surprisingly, not for educational purposes. And yet library usage studies on electronic books indicate that they do circulate, in some cases circulating more than their print counterparts (Littman & Connaway, 2004). Similar research by California State University, however, discovered that when both print and electronic formats for the same title were available, they were both used equally (Littman & Connaway, 2004). Research with library usage studies admittedly reveal an inability to know how the books are being used with some suggestion that e-books are being used for quick reference or to complete a research paper, but not for sustained reading activity (Littman & Connaway, 2004). Other researchers have also noted that e-books are well suited for a reference environment, either because the amount of text needing to be read electronically is short or because short passages are usually permissible to print. Perhaps e-books are being checked out because they offer a new technology in need of sampling. It may be possible that high circulation statistics are more indicative of the product's novelty factor and, once users have had enough exposure to the product, we will see less demand. Coleman (2004) examined e-book usage figures in a library and noted that fewer than 100 titles out of 1,625 had been accessed more than 10 times, which may indeed be indicative of a novelty factor. Coleman (2004) suggests that people may be more inclined to use an e-book if the print version is unavailable and that readers with an initial interest in computers may be more receptive to e-books; however, he notes that both theories require further study. The California State study suggested that, as users become more familiar with electronic books, their use will increase (Littman & Connaway, 2004). Dillon (2001) also suggests that as more individuals gain experience using e-books, the use of the product will expand. What has not been suggested is that the opposite may be just as likely. As more people are exposed to e-books, more people may reject them as the preferred method of reading. Coleman (2004) suggests that "e-books may simply offer a better delivery mechanism, not a better way to read" (p.124).

While e-books certainly appear to have many practical applications for educational settings, current research on students' perceptions indicates a continued preference for learning with print (Noyes & Garland, 2005, 2006). Bennett and Landoni (2005) also documented in their findings that "although the majority of users interviewed expressed a willingness to use e-

books in the future, it was clear that many feel that currently the usability of e-books is too poor to offer a genuine alternative to printed resources for serious academic study” (p. 15). Surveys of students who have been involved in test markets of electronic textbooks have clearly indicated a preference for the print, even when the price of the electronic textbook was substantially reduced (Carlson, 2005). This seems to boggle the minds of producers, librarians, and technology advocates who still cling to the notion that the paperless office will someday materialize. Bennett and Landoni (2005), citing a JISC Gold Leaf study from 2003, noted that students who were questioned about their use of e-books indicated that they were using them for reference purposes but not for leisure reading. The National Association of College Stores surveyed 4000 students on 21 campuses and found that 73% preferred buying textbooks in a traditional format (Carlson, 2005). Another study discovered that 80% of the students surveyed preferred “to read a digital piece of text in print in order to understand the text with clarity” (Liu, 2005, p. 702). The students did not seem to mind accessing the text electronically but wanted the ability to print it to read it, indicating once again the desire to print with the suggestion that there is something strenuous or unpleasant about reading text electronically.

The business model of the e-textbook market has also revealed some frustrating practices, such as only being able to download the textbook once to a PC, a limited number of page views (permitting students to review a page so many times before being locked out), and passwords set to expire in a short period of time rendering the product unavailable for future reference (Carlson, 2005; Foster, 2005). Electronic textbooks also don’t offer students the opportunity to share or resell their text (Carlson, 2005). Examining some of the survey comments provides even more insight into consumer expectations. One responder from Carlson’s (2005) study noted that you “can’t go to the library with the e-book. Have to be tied to a monitor.” Another responder from the same survey indicated a refusal to buy an online textbook, “I prefer to have an actual hard copy of the book on hand to read whenever I want” (Carlson, 2005). Liu (2005) also notes the discovery that undergraduate students who read online text find it to be more difficult to understand, less interesting, and the authors less credible than reading the printed version.

Other survey findings also indicate a preference for print. Gunter (2005) found that 56% of 3,916 subjects on a survey in the United Kingdom indicated a preference for not reading “extended passages of text from a screen” (p.513). A survey of library science students in 2003 indicated an unwillingness to use e-books citing such reasons as the difficulty in reading and browsing and the requirement of special equipment to use (Chu,

2003). Another study noted that 46% of online consumers, people who are used to shopping and supposedly working in an online environment, expressed a lack of interest in reading any form of digital content (Peek, 2005). Reid (2002), reporting on a survey conducted by Knowbetter.com, concluded that users were frustrated by high prices for e-books, the lack of transferability between electronic devices, and the limited title selection.

## READING SPEED AND COMPREHENSION

Researchers, primarily in the fields of education and psychology, have been studying the effects of electronic text on reading speed, comprehension, and cognitive load for at least three decades. Noyes and Garland (2005, 2006) surveyed undergraduate psychology students in two separate studies and noted that students showed a clear preference to learn from books rather than computers and even expected to learn more from the books. When Noyes and Garland repeated the study they did find more acceptance for using both books and computers to learn from, but the preference to use print remained.

Although educational research on the effects of reading comprehension with computerized text began in the 1970s, the studies have revealed mixed findings that reading electronic text either increases, decreases, or has no effect on comprehension (Doty et al., 2001; De Jong & Bus, 2002, 2003; Maynard, 2005; Reinking, 1988). Unfortunately, all of these studies have admitted flaws in their methodology making it difficult to say with any certainty that electronic text has a positive or negative effect on comprehension. Observable limitations include small population sets (30 to 100 subjects); using beginning or elementary readers; differences in the print and electronic text used within the same study; and few controls for distractions, prior knowledge, or experience using computers. One consistent finding with the research reveals that interactive, hyper-infused text seems to have a positive effect on reading comprehension (Doty et al., 2001).

Research on reading comprehension has also revealed that reading speed and comprehension are correlated. Reading fast is seen as increasing comprehension while reading slowly is seen as reducing or slowing comprehension. Reading speed is documented as being reduced up to 30% on an LCD panel, indicating the potential for reduced comprehension (Liu, 2005; Rao, 2004). Some research has indicated, however, that it is possible to read too fast to fully comprehend the text (Nell, 1988).

## COGNITIVE WORKLOAD

Aside from screen resolution, there are also issues involved in trying to read electronic text while manipulating the electronic device. Reading a paper based

book requires the eyes to skim the text with fairly good resolution and manually turn pages as needed. This is a relatively straightforward and, in most cases, enjoyable process that occurs without our awareness when our attention is fully focused on the content (Nell, 1988). But with electronic text there is the issue of reading from a low resolution environment coupled with the need to continuously click and scroll. Clicking and scrolling involve more steps than simply turning a page. Either a mouse or a stylus are used for both the clicking and scrolling processes so our ability to keep up with the text is more or less dependent on how fast the computer device can respond to the clicking and scrolling. Personal experience with attempting to read a book on a PDA reveals that I am able to read printed text much faster than I am able to click and scroll and that the tasks of clicking and scrolling interfere with my ability to keep my place on a screen the size of a half dollar. Wastlund et al. (2005), in two sets of experiments, assessed the physiological and psychological factors of using video display technology versus paper and noted the dual-tasking problem involved with manipulating electronic text. Test subjects in both experiments were found to have impaired performance in both consumption and use of the information in the VDT format coupled with higher levels of stress and tiredness. Wastlund et al. (2005) suggest that we experience a type of cognitive overload when interacting with electronic text caused by the challenge of reading in a low-resolution environment coupled with the task of manipulating the electronic device. The result is reduced comprehension, increased eye fatigue, and increased overall tiredness (Wastlund et al., 2005). My experience supports the research findings that problems exist in trying to read and comprehend electronic text due to the dual-tasking functionality involved in both reading and comprehending, while scrolling, clicking, and trying to keep one's place in a lower resolution environment.

Other research has uncovered issues involved with spatial memory. Liu (2005) discusses research findings suggesting that a person's ability to remember where a certain passage was found in a print-based book is an ability that does not appear to transfer to the electronic text. "Flipping and scanning (a reading pattern associated with printed documents) is not only a means for locating information in a document, but also a means to get a sense of the whole text. Scrolling on a computer screen does not support this mode of reading and information processing" (Liu, 2005, p. 703). At this point, the most definitive statement that can be made is that we simply do not know enough about the effects of reading in a digital environment to make any declarative statements. Even the researchers of existing studies admit that more research is needed. The admission that we don't know enough and that more research is

needed is the one commonality found in almost every research article on electronic text.

## **SOLVING THE E-BOOK PUZZLE.**

E-books seem to generate more questions than answers. Certainly the lack of a stabilized product directly contributes to market success, but this alone is not a reason for the lack of e-book popularity. If the majority of the population had fully embraced electronic books, as they have electronic journals, the market might have been faster to offer a stabilized, affordable product, but because the product was introduced without consideration to some of the known limiting factors, as well as the possibly unknown factors regarding e-book usage, the consumer response was lukewarm at best and has, for the most part, continued to be mediocre.

Advocates of both e-books and the technology behind them seem reluctant to admit that there are any problems with e-books outside of perhaps a better marketing strategy or a "magic bullet" to push the industry forward (Herther, 2005). When some of the stagnating factors are presented, advocates are quick to cite statistics of use as indicators that the momentum for e-books may have slowed but has not died. Statistics of any kind indicating usage are seen as a positive sign that e-book technology still has the potential to replace paper. It just seems that it may take a bit longer than anticipated. It is entirely possible, however, based on some of the existing research, that e-books, at least in their present form, will be nothing more than another means of accessing information. "Early adopters have begun to utilise this format, but many readers are still reluctant to abandon paper books for books held on an electronic reader" (Gunter, 2005, p.514).

When compared to the electronic journal, which was quick to find an industry standard that permits printing for in-depth reading, the lack of a similar industry standard without print limitations is a major factor affecting the success of electronic books. As Herther (2005) notes in her research, "The industry itself remains optimistic, though tempered by the realities of the many obstacles which will need to be overcome in order for the e-book as they define it, to become viable" (p. 47). Another hurdle to creating a more viable product seems to be finding agreement on a standard for digital rights management (Dillon, 2001). The Association of American Publishers has proposed minimal standards but, unfortunately, has left much of product development up to the individual producers (Dillon, 2001). Herther (2005) accurately notes, "As long as proprietary or competing, incompatible standards exist, e-books will remain a small market" (p. 47).

Technical and business model issues are only one piece of the e-book puzzle. Research findings indicate

potential problems in utilizing this medium and, along with survey responses, show there are other issues affecting use. When we examine some of the existing research on reading and comprehending in a digital environment, we find results indicating problems with reading speed, spatial memory, and impairments with cognitive load leading to increased physiological and psychological stress. We also have user surveys, of which this article only provides a sampling, indicating a reluctance to use electronic media for sustained reading activity. To make matters even more difficult to decipher, the present research shares a commonality in finding that more research is needed. Not enough is known about reading in a digital environment to make a declarative statement that e-books have either a positive or negative effect on our cognitive abilities. For most, it does appear that reading in a digital environment is not a pleasant experience worth repeating unless there is a need for the information that overrides the discomfort factor. Social implications also seem frequently overlooked amidst the hype to jump on the e-book bandwagon. When e-books are held up in conversations discussing the digital divide, it seems evident that electronic books have a greater potential to widen the divide rather than offering any bridging solutions. Problems with reduced reading speed and slower comprehension also have strong implications for literacy rates. "The digital environment has begun to affect how people read. However few studies have explored this fundamental issue" (Liu, 2005, p.703). And what about the population masses that do not have computer skills, do not know how to manipulate a computer and cannot afford the electronic gadgetry required to read this new medium?

This is a puzzle that may eventually be solved with greatly improved and affordable technology or with the development of a book hybrid that is better suited to the digital environment. The present literature suggests that to make consumers happier with existing e-books, producers and providers of e-books need to focus on three things users want: 1) a cheaper product; 2) the ability to print and manipulate the text electronically to suit their needs; and 3) a version portable enough to be used on all of their electronic devices. Consumers expect the electronic book to be less expensive than the paper (Armstrong et al., 2002; Bennet & Landoni, 2005; Boss, 2004; Reid, 2002). A quick search in *Books-in-Print*, however, reveals that electronic books are being sold by publishers at the same price as the cloth, even when a less expensive paper version is available.

While improvements in technology are expected to solve many of the implied problems with the current e-book, especially with screen resolution, there are some strengths of the present product worth noting. For libraries, the literature provides some fairly straightforward criteria to use when considering the addition of

electronic books to the collection. Littman and Connaway (2004) suggest that e-books be purchased for heavily circulated print copies and that selection of e-book titles be targeted for disciplines with known usage such as psychology and education. For reference purposes, the e-book is quickly becoming the preferred format because reference works are shorter, making them easier to digest on screen with the added enhancement of text searching (Gunter, 2005). E-books tend to be well-received by distance education students who may only need to consult a few passages of a text for reference or research purposes and may not necessarily read the work from cover to cover (Littman & Connaway, 2004). There are also some indications that hyper-infused text aids reading comprehension, giving some support in the direction of the development of a book hybrid that takes better advantage of the electronic environment. Another discovered advantage with e-books is that allowing patrons to browse a title electronically has actually increased sales of the print version (Littman & Connaway, 2004).

On the surface, e-books appear to offer numerous advantages over their print counterparts, but on closer inspection we see that there are underlying issues with e-books that make their use more complex than simply finding an industry standard or developing a better business model. In fact, some of the present research raises the question that if standardization and better business models do materialize, will the e-book be any more desired then it is presently? Will improvements in the technology happen in five or more years? When it does happen, we will have to hope that the improvements provide us with a product that is not only affordable but also offers the same comforts and pleasure experienced with paper. At this point it seems important to note that the printed word has not lost its appeal. "E-books offer features that print materials cannot match, but they still do not beat print materials for reading comfort. They also cannot duplicate the simplicity of the printed book, which is always ready to be picked up and read without having to learn 'how-to' or having to consider compatibility with a specific computer operating system" (Balas, 2001, p. 58). E-books are definitely here to stay, but replacing the print counterpart for sustained reading activities appears to be farther into the future than initially predicted.

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